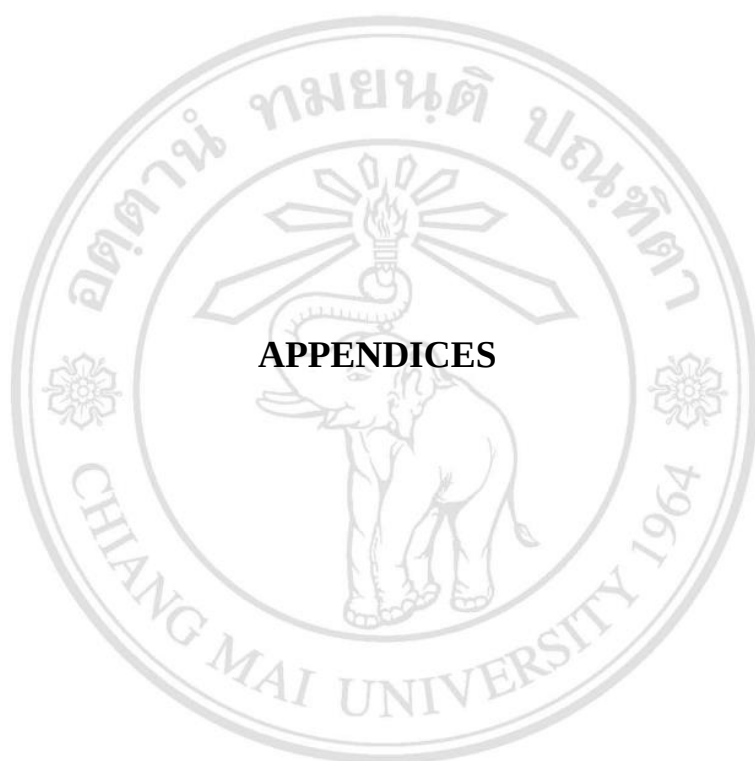




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APPENDICE A

Location of kiln site in Northern Thailand



1. Wiang Kalong kiln site, Chiang Rai province.
2. Wang Nua kiln site, Lampang province.
3. Sankamphaeng kiln site, Chiang Mai province.
4. Phan or Pong Daeng kiln site, Chiang Rai province.
5. Thung Tao Hai kiln site, Lampang province.
6. Wang Hai kiln site, Lampang province.
7. Wang Tha Kaan kiln site, Chiang Mai province.
8. Ban Mae Tao Hai kiln site, Chiang Mai province.
9. Huai Mae Tam kiln site, Phayao province.
10. Wiang Bua kiln site, Phayao province.
11. Huai Nam Yauk kiln site, Mae Hong Son province.
12. Intakhin kiln site, Chiang Mai province.
13. Ban Bo Suak kiln site, Nan province.

APPENDICE B

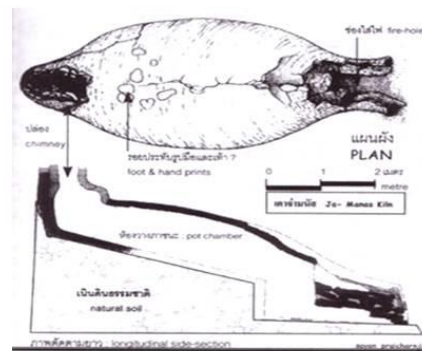
Ban Bo Suak kilns



Ja-Manas Kiln

Size : Long 6.50 M

Wide 3.00 M

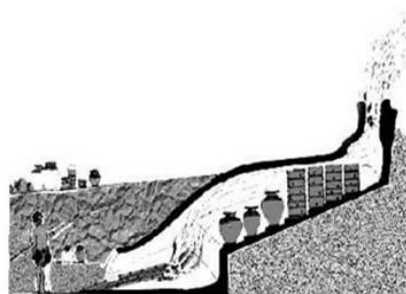


Sunan Kiln

Size : Long 6.50 M

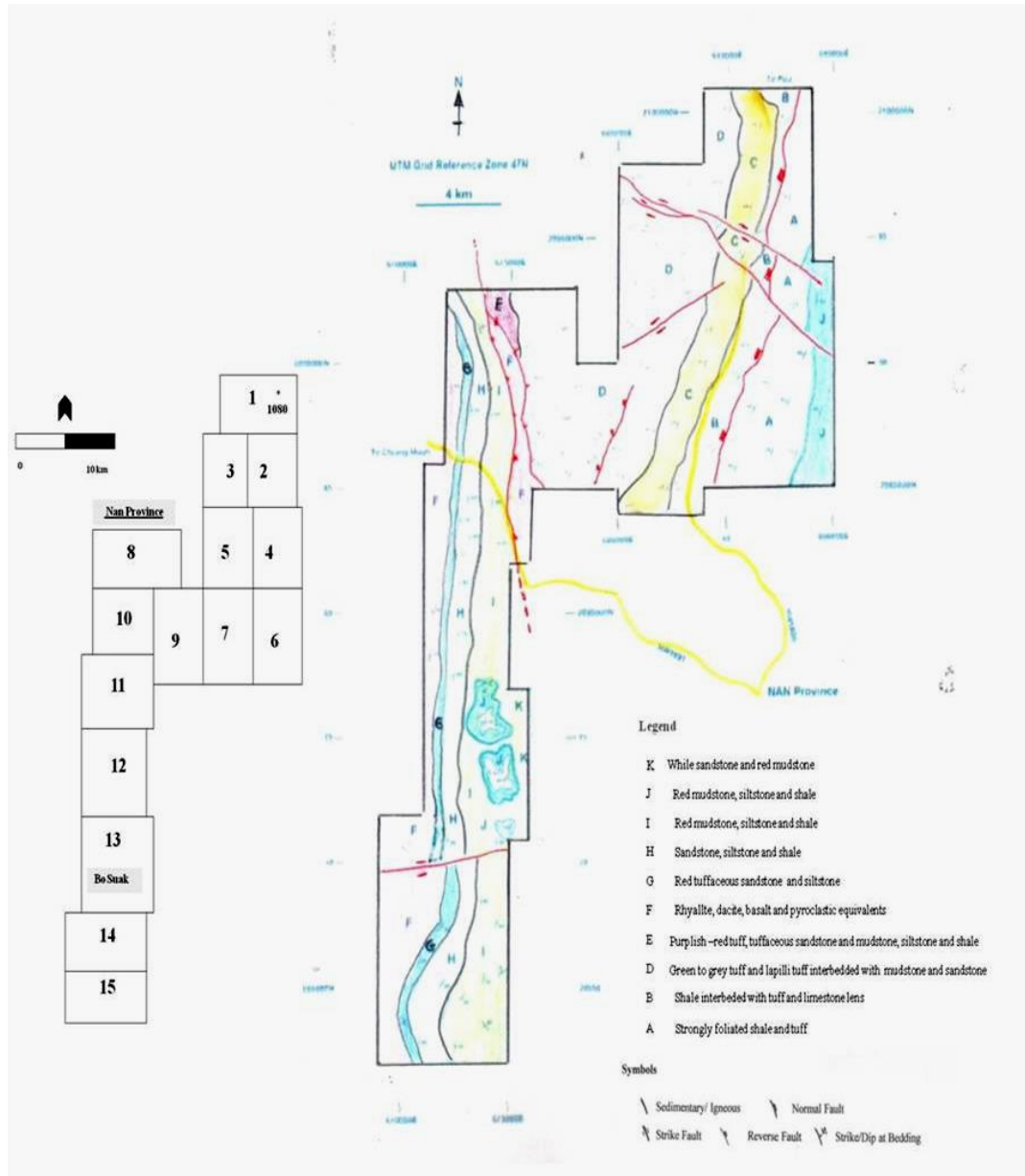
Wide 3.00 M

Chamber kiln 0.8 M



APPENDICE C

Geologic of Wiang Sa Nan province

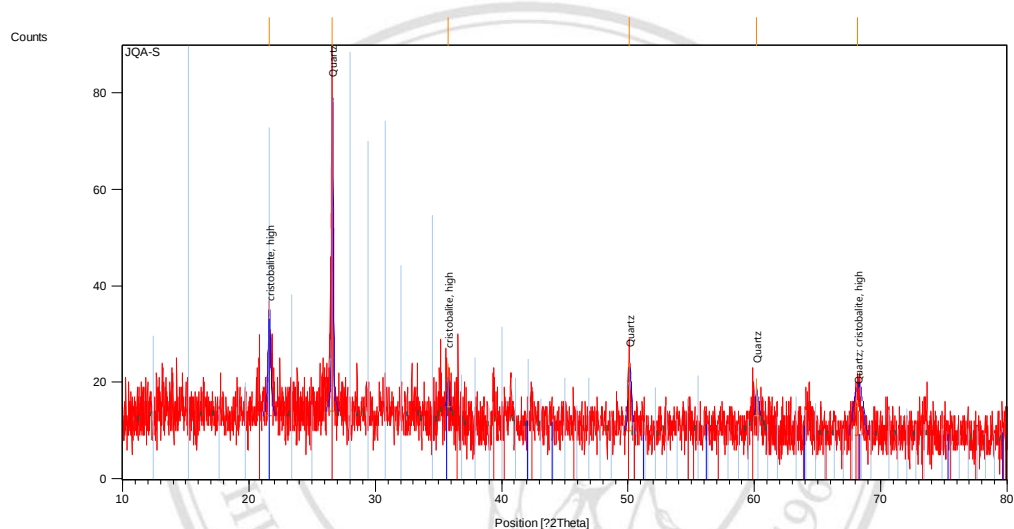


Geological mapping was carried out in an approximately 300 km². Sedimentary, volcanic, pyroclastic and low-grade metamorphic rocks in the area were grouped into 11 rock units. A large part of the clastic and carbonate sedimentary succession was deposited in shallow marine environments during the Permian to Triassic

APPENDICE D

Data JCPDS files

JQA.SH

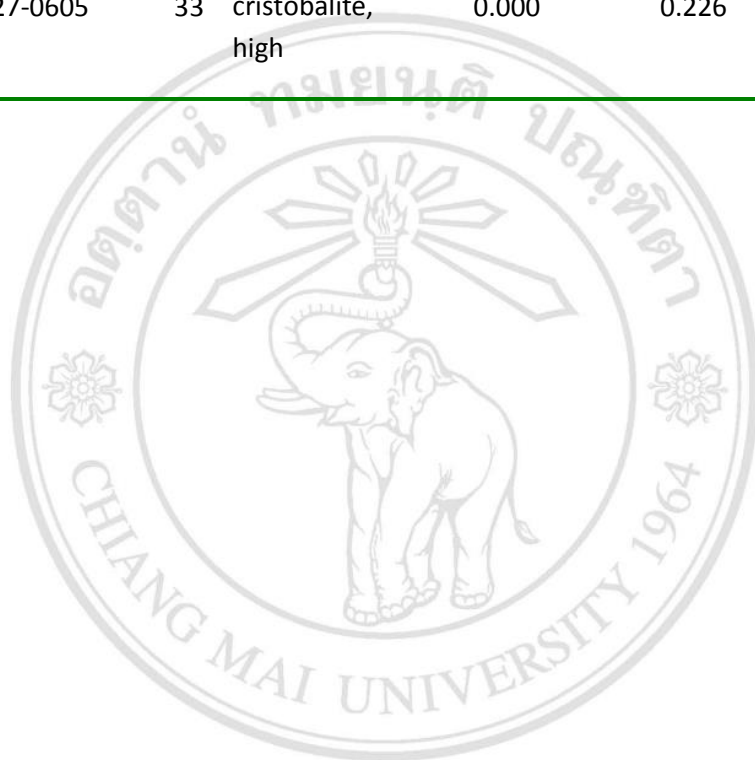


Peak List: (Bookmark 3)

Pos. [°2Th.]	Height [cts]	FWHM [°2Th.]	d-spacing [Å]	Rel. Int. [%]
21.5980	20.61	0.2362	4.11464	29.26
26.5996	70.43	0.1181	3.35123	100.00
35.7400	8.90	0.1733	2.51236	12.64
50.1138	14.07	0.2362	1.82032	19.98
60.1608	7.80	0.1302	1.53814	11.08
68.1586	7.31	0.8640	1.37470	10.38

Pattern List: (Bookmark 4)

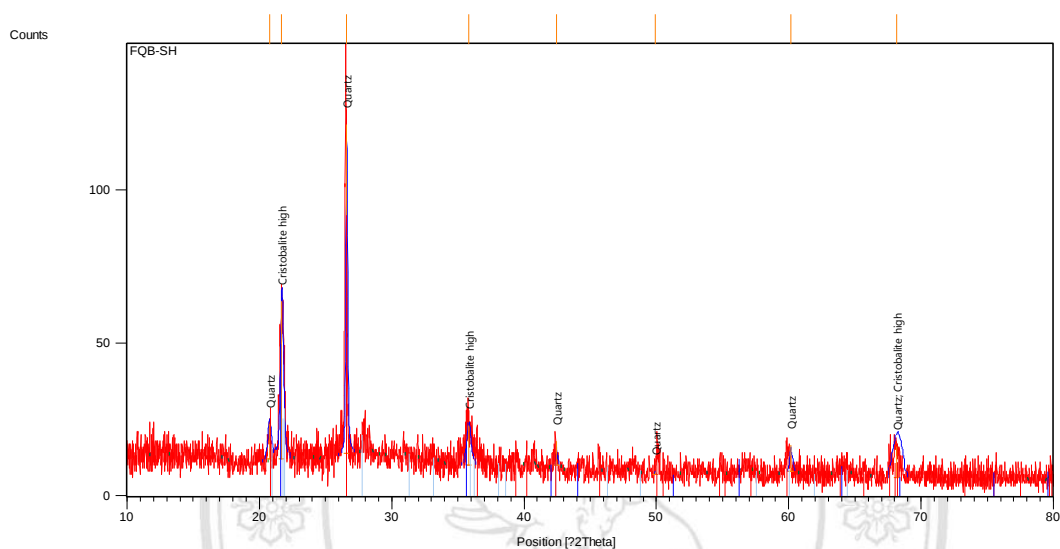
Visible	Ref. Code	Score	Compound Name	Displacement [?2Th.]	Scale Factor	Chemical Formula
*	01-083-0539	43	Quartz	0.000	0.870	Si O ₂
*	00-027-0605	33	cristobalite, high	0.000	0.226	Si O ₂



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FQB.SH

Peak List: (Bookmark 3)



Pos. [2Th.]	Height [cts]	FWHM [2Th.]	d-spacing [Å]	Rel. Int. [%]
20.7634	11.51	0.3542	4.27811	10.70
21.6941	51.73	0.2657	4.09663	48.07
26.5865	107.63	0.1328	3.35285	100.00
35.8089	13.11	0.3542	2.50768	12.18
42.4554	7.90	0.0779	2.12922	7.34
49.9000	1.00	0.0900	1.82761	0.93
60.1300	8.62	0.1759	1.53885	8.01
68.1505	10.02	0.8640	1.37484	9.31

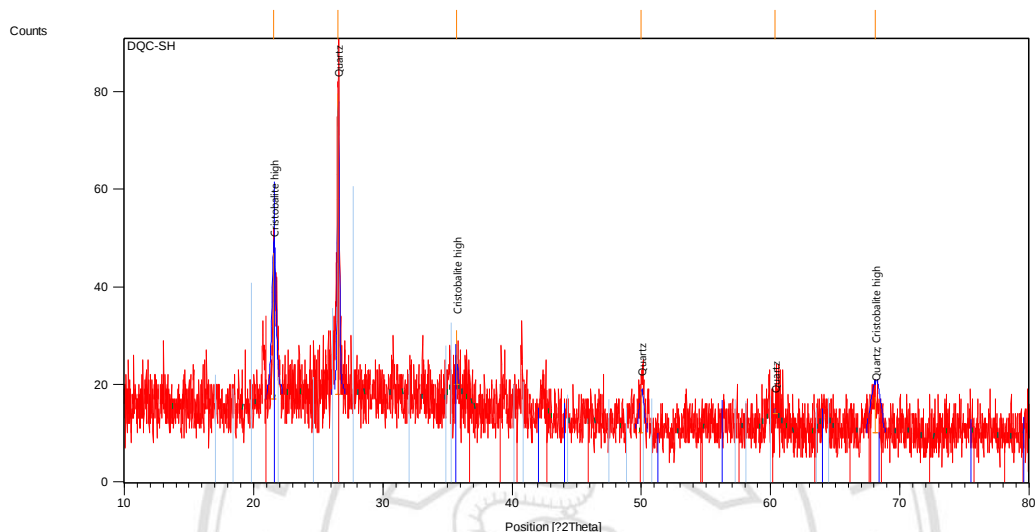
Pattern List: (Bookmark 4)

Visible	Ref. Code	Score	Compound Name	Displacement [Å]	Scale Factor	Chemical Formula
*	01-083-0539	39	Quartz	0.000	0.526	Si O ₂
*	01-076-1390	30	Cristobalite high	0.000	0.255	Si O ₂



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PQC.SH



Peak List: (Bookmark 3)

Pos. [°2Th.]	Height [cts]	FWHM [°2Th.]	d-spacing [Å]	Rel. Int. [%]
21.5618	30.02	0.3542	4.12148	48.67
26.5478	61.69	0.1476	3.35765	100.00
35.7016	11.20	0.0766	2.51497	18.16
49.9928	8.49	0.3542	1.82444	13.77
60.3100	1.00	0.0900	1.53469	1.62
68.0605	7.49	0.8640	1.37644	12.13

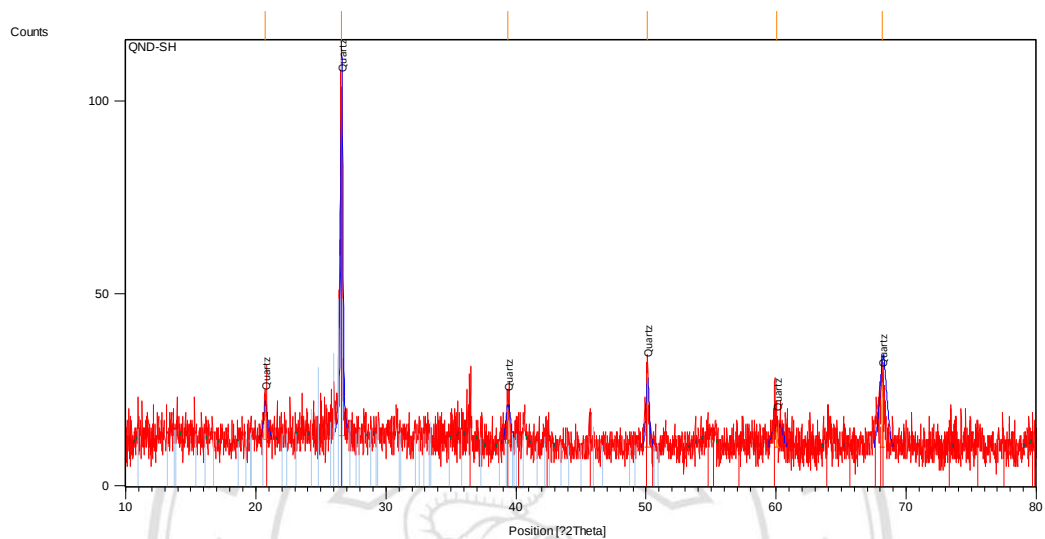
Pattern List: (Bookmark 4)

Visible	Ref. Code	Score	Compound Name	Displacement [°2 θ .]	Scale Factor	Chemical Formula
*	01-085-1780	35	Quartz	0.000	0.824	Si O ₂
*	01-076-1390	31	Cristobalite high	0.000	0.491	Si O ₂



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NQD.SH



Peak List: (Bookmark 3)

Pos. [°2Th.]	Height [cts]	FWHM [°2Th.]	d-spacing [Å]	Rel. Int. [%]
20.7329	8.78	0.3542	4.28434	8.95
26.5886	98.14	0.1771	3.35258	100.00
39.3566	9.46	0.3542	2.28942	9.64
50.0765	19.37	0.2362	1.82159	19.74
60.0456	5.51	0.9446	1.54081	5.62
68.1653	16.78	0.5760	1.37458	17.10

Pattern List: (Bookmark 4)

Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-083-0539	46	Quartz	0.000	0.783	Si O ₂

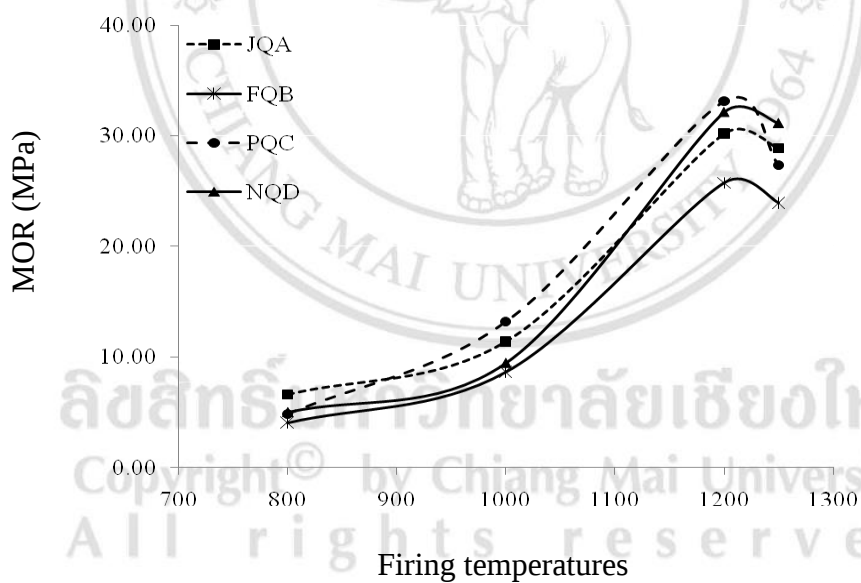


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APPENDICE E

Bending Strength

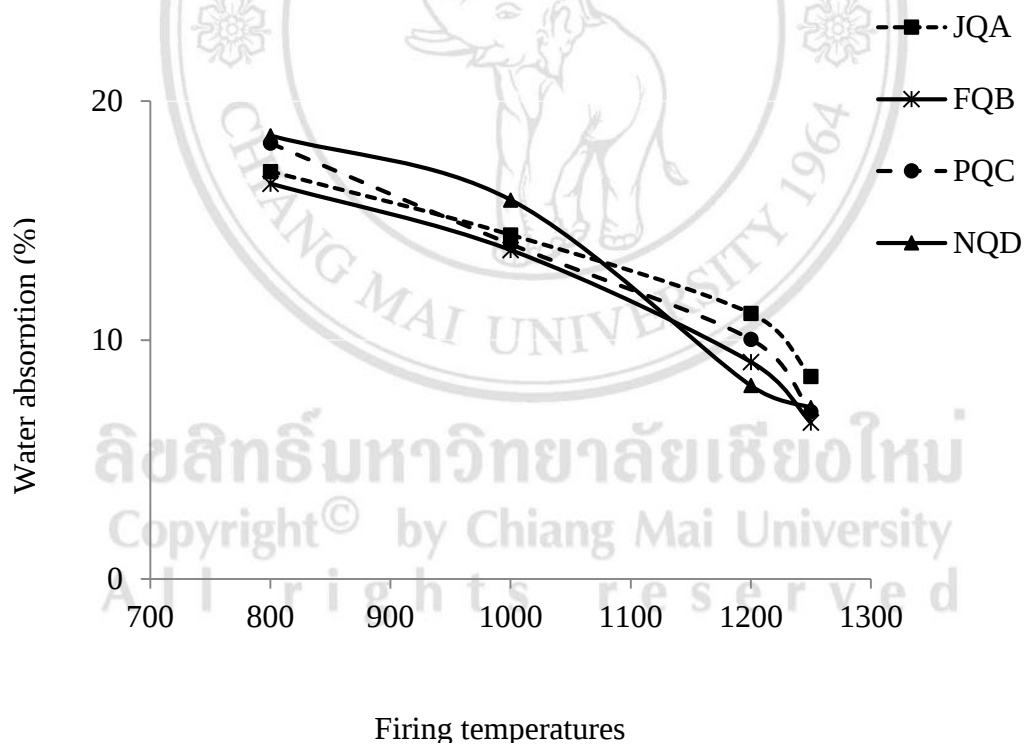
	JQA	FQB	PQC	NQD
800	6.62	4.06	4.83	5.03
1000	11.4	8.65	13.18	9.47
1200	30.2	25.73	33.11	32.11
1250	28.87	23.94	27.35	31.12



APPENDICE F

Water absorption

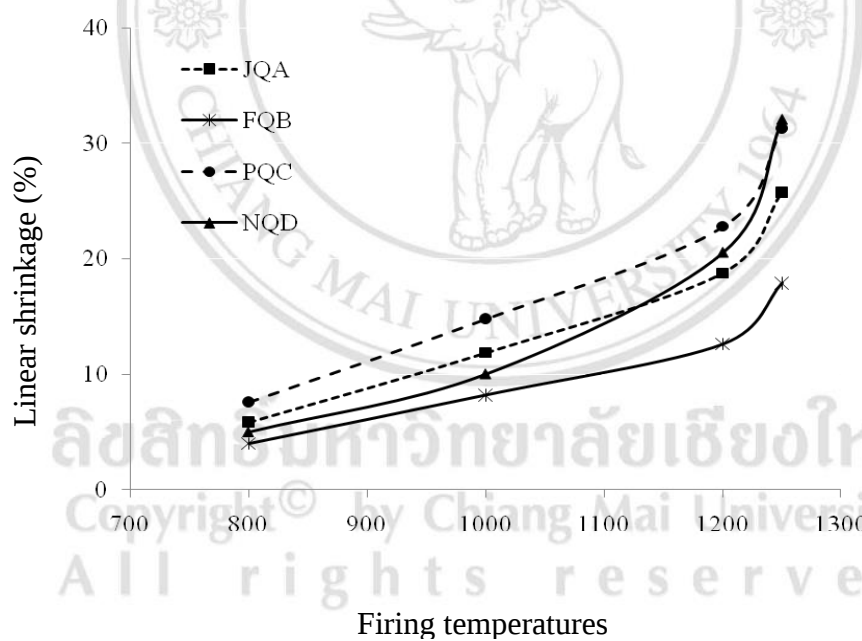
	JQA	FQB	PQC	NQD
800	17.06	16.55	18.25	18.56
1000	14.41	13.77	14.02	15.87
1200	11.12	9.09	10.03	8.1
1250	7.48	6.55	8.01	7.18



APPENDICE G

Linear shrinkage

	JQA	FQB	PQC	NQD
800	11.11	12	11.62	12
1000	23.18	22.21	24.55	26.22
1200	29.18	27.15	31.27	30.52
1250	32.11	30.41	37.1	34.65



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International conference

1. **Usanee Malee** and Sakdiphon Thiansem, “Characterization and properties of clay in Ban Bo Suak simulate Ban Bo Suak ancient pottery in Nan Province, Thailand” Pure and Applied Chemistry (PACCON2012), Chiang Mai, Thailand (2012).
2. **Usanee Malee** and Sakdiphon Thiansem, “Basic properties of clay from Ban Bo Suak in Nan Province, Thailand.” International Conference on Tradition and Advanced Ceramics (ICTA 2012) Bangkok, Thailand (2012).
3. **Usanee Malee** and Sakdiphon Thiansem, “Investigate the characterization and properties of indigenous clay from Dong Phuhor kiln sites in Nan Province, Thailand.” International Conference on Science and Social Science 2012: Sustainable Development (ICSSS 2012), Maha Sarakham, Thailand (2012).
4. **Usanee Malee** and Sakdiphon Thiansem, “Preparation and characterization of clays from different areas in Ban Bo Suak, Nan province, Thailand.” 8th International Conference on Materials Science and Technology (MSAT-8). Bangkok, Thailand (2014).

5. **Usanee Malee** and Sakdiphon Thiansem, “Analytical study of ancient pottery from the archaeological site of Ban Bo Suak from Nan province, Thailand.” International Conference on Traditional and Advanced Ceramics (ICTA2015). Bangkok, Thailand (2015).
6. **Usanee Malee** and Sakdiphon Thiansem, “Investigation of ancient pottery from Nan province, Thailand.” 10th International Conference on the Physical Properties and Application of Advanced Materials (ICPMAT2015), Chiang Mai University, Chiang Mai, Thailand. (2015).

International publication

1. **Usanee Malee** and Sakdiphon Thiansem, “Preparation and characterization of clays from different areas in Ban Bo Suak, Nan province, Thailand.” Key Engineering Materials Vol. 659 (2015) pp 127-131, Trans Tech Publications, Switzerland Revised: 2015.
2. **Usanee Malee** and Sakdiphon Thiansem, “Analytical study of ancient pottery from the archaeological site of Ban Bo Suak from Nan province, Thailand.” Key Engineering Materials Vol. 609 (2016), pp 18-22 Trans Tech Publications, Switzerland Revised: 2016.



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